

The background of the entire page is a close-up, low-angle shot of several dandelion seed heads. The seed heads are in various stages of maturity, with some showing the characteristic white, feathery pappus. The lighting is soft and diffused, creating a dreamy, ethereal atmosphere. The colors are muted, with a lot of greys, whites, and soft blues, giving it a monochromatic feel.

SEED BANK

Student: Rusudan Margishvili

Instructor: Iker Gil

Advisor: Martin Felsen

Illinois Institute Of Technology
ARCH 523 Masters Project Preparation
FALL 2012

SEED BANK

Student: Rusudan Margishvili
Instructor: Iker Gil
Advisor

An aerial photograph of a tropical rainforest. The dense green canopy is punctuated by numerous circular and oval-shaped clearings of varying sizes. These clearings are surrounded by a thick ring of trees, creating a 'bullseye' pattern. Some clearings appear to be open fields, while others contain smaller trees or shrubs. The overall scene illustrates a complex and diverse ecosystem.

TODAY 60,000 TO 100,000
SPECIES OF PLANT ARE FACED
WITH THE THREAT OF
EXTINCTION*

LIST OF CONTENTS

WHY SEED BANKS?9

Plants & human life	10
Plants, humans & global warming	11
About the project	13
Seed bank network	14
Stakeholders	15
Stakeholders’ relationships	17

CASE STUDIES18

Existing seed banks	20
Millennium Seed Bank Project	21
Svalbard Global Seed Vault	24
The Seed Cathedral	25
Eden Project	26
Institute of the Botanical Garden of Barcelona	27
Edf Archives Center	28
The Factory	29
Las Palmas Water Theatre	30
Endesa Pavilion	31

SITE32

Site Selection Criterias	34
Geographical changes	34
Economic conditions	35
Plant diversity	36
Proposed network diagram	37
Prototype in the United States - The Grand Canyon	38
Preliminary Location - South Rim	39

PROGRAM42

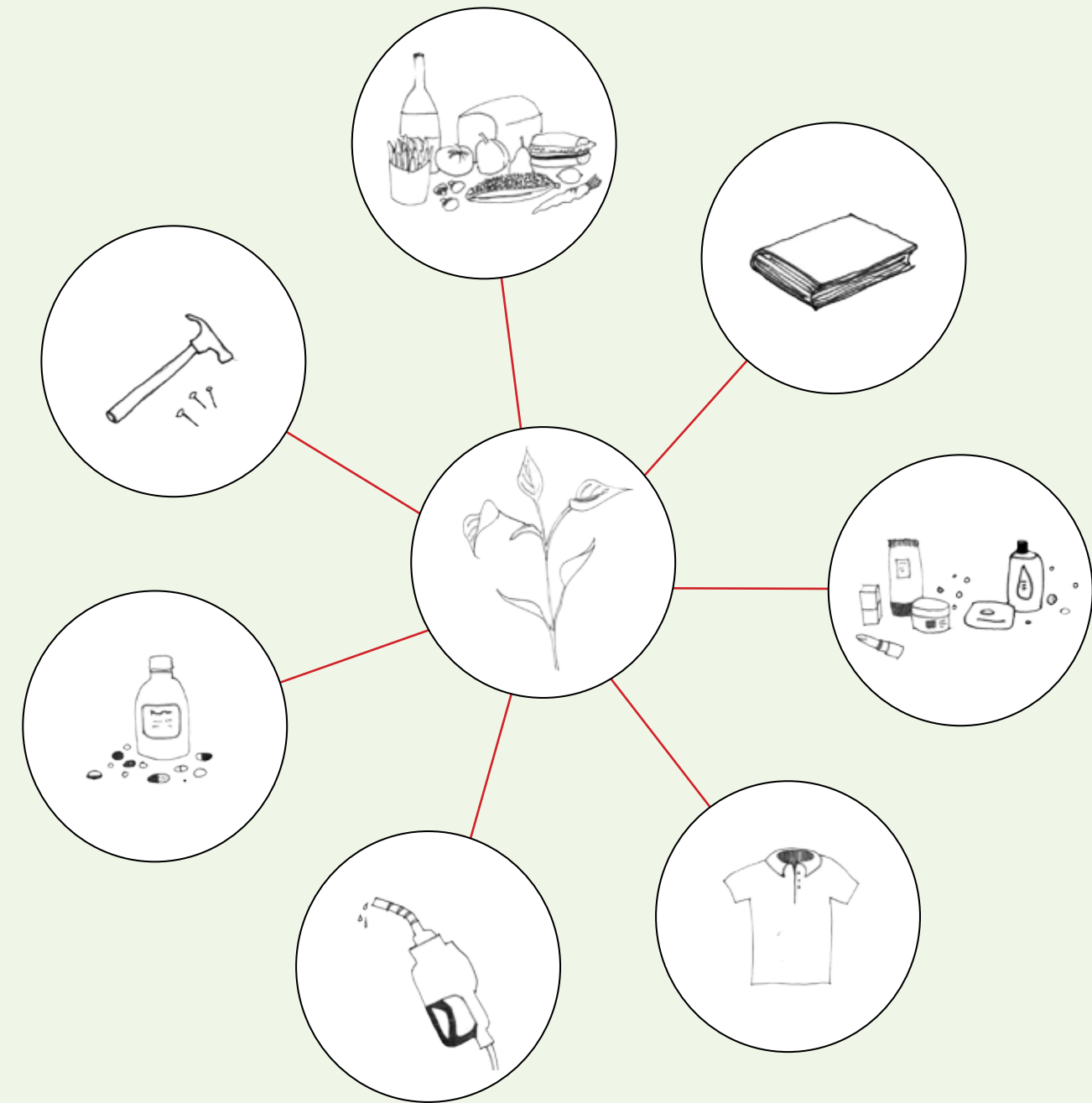
Quantitative analysis	42
Program scaled	44
Functional relationships	45
Aesthetic qualities	46
Light Conditions	46
Materiality	47

REFERENCES48

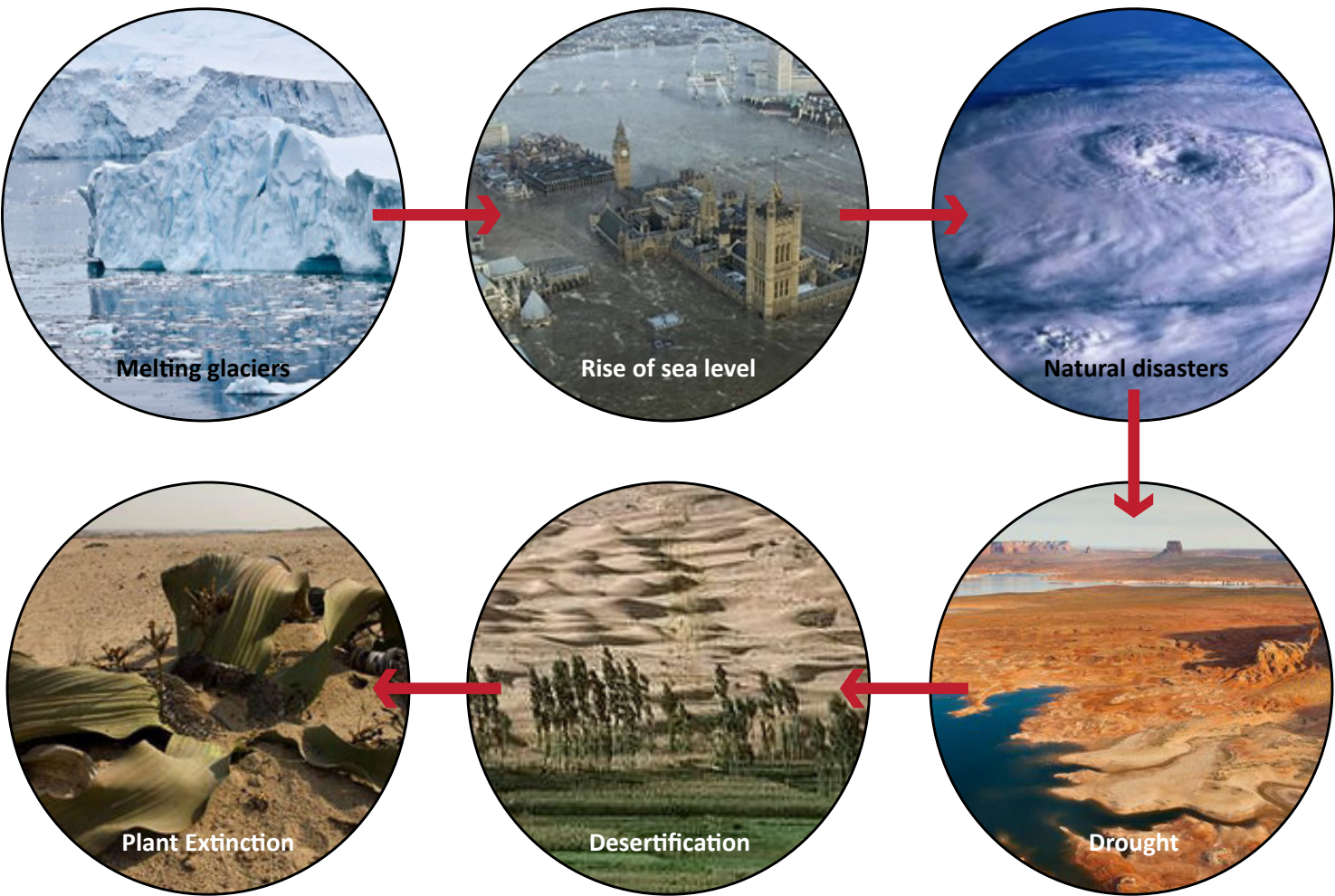


WHY SEED BANKS?

PLANTS & HUMAN LIFE



PLANTS, HUMANS & GLOBAL WARMING



Source: National Geographic News. *Global Warming Fast Facts*. Updated 14 June 2007. News.NationalGeographic.com. <<http://news.nationalgeographic.com>>



So if all human life depends on plants,
perhaps we should try to save them?

* Photo: National Geographic Magazine

ABOUT THE PROJECT

PROJECT DESCPTION:

All life depends on plants. The genetic information for future plants is held in their seeds, so the biodiversity of our planet, as well as the sustenance of our species and others', depends entirely on the seeds that survive from generation to generation.

Now **plants are under threat**. They are under threat because of man-made disasters and climate change.

"And they are also under threat because they are sharing a planet with people like us", -says the Main-Board Trustee of Millennium Seed Bank Project, Johnathan Drori: "And people like us want to do things that destroy plants and their habitats. And whether it is because of the food production or the introduction of alien plants into places where they really oughtn't be, or because of habitats being used for other purposes, all these things are meaning that plants have to adapt, or die, or move. And plants sometimes find it rather difficult to move, because there might be cities or other things on the way."

So what happens to plants in such case becomes pretty obvious - they die out; this will cause a chain reaction of fauna extinction, since they will have neither shelter nor food.

If all life depends on plants, shouldn't we try to save them?

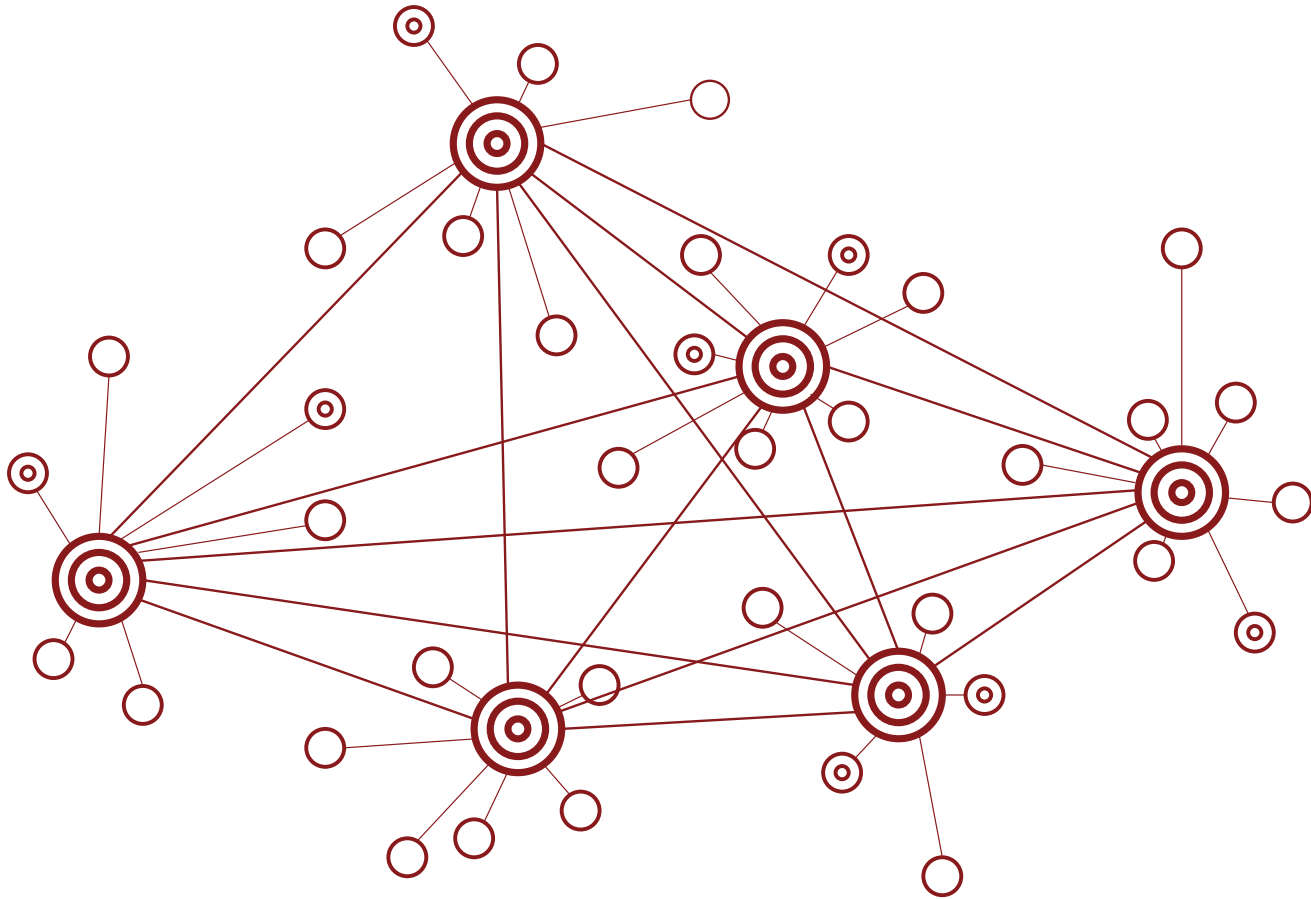
Seed bank is an institution saving plants from extinction. The researchers **collect, organize, research and conserve** seeds outside their natural habitat and ship them to original location in order to restore natural habitat.

My project will be a prototype of a seed bank developed for a global network of flora genetic information banks. The network, consisting of international, national and regional seed banks, will exchange information and seeds, and will act as world's giant backup collection. By designing a prototype of the international seed bank, I will propose a standard for the insitution. The building will include seed storages and labs, where groups of scientists would register and dry collected seeds, then conserve and reproduce them for natural habitat rehabilitation. The facility will also include educational facilities to help **rise public awareness** and temporary accommodation for residence or travelling researchers.

POTENTIAL DESIGN RESPONSES:




- Creating a **net of genetic centers** in different parts of the world according to economical and political stability and plant hardiness zones
- Designing a **prototype** building which would serve as an example of possible standard for seed bank institution.
- National parks and remote areas for location.
- Design as a **statement**.
- Making the building as much **off-grid** and sustainable as possible by using energy generated from nature:
 - Electricity - solar panels
 - Water - for harvesting and recycling

SEED BANK NETWORK



World floristic genetic information bank network will be spread throughout the world. The program will be distributed in the system of centers and sub-centers. Centers will be international, collecting seeds from different locations and acting as back-up system for sub-centers. They will contain laboratories and research facilities, as well as temporary accommodation and public education facilities, and will be large in scale. Sub-centers will have a regional or national meaning will contain only seed storages and green houses.

LEGEND

-  National seed bank. Program: seed storages.
-  Regional seed bank. Program: green houses, seed storages.
-  International seed bank. Program: research labs, conservation labs, archiving facilities, exhibition halls and lecture rooms, green houses, seed storages, archives, temporary accommodation facilities for scientists.

STAKEHOLDERS



- RESEARCHERS
- Collect seeds in different parts of the world
 - Record data
 - Prepare seeds for shipping

- Facilities needed:
- Seed Reception
 - Archives



- RESEARCHERS
- Unpack seeds
 - Check papers
 - Identify seeds
 - Record data
 - Assess storage needs

- Facilities needed:
- Seed preparation rooms
 - Archives
 - File servers
 - Accommodation



- RESEARCHERS
- Estimate seed quality in different time periods
 - Dry and package seeds
 - Store seeds in cold storage rooms

- Facilities needed:
- Seed washing and drying facilities
 - Labs
 - Seed storages
 - Accommodation



- BOTANISTS
- Check germination
 - Observe growing out process

- Facilities needed:
- Incubator
 - Seed storages
 - Greenhouse
 - Accommodation



- MANAGERS AND ADMINISTRATION
- Responsible for seed bank's management
 - Organization and coordination

- Facilities needed:
- Office
 - Meeting room
 - Accommodation



- VISITING SCIENTISTS
- Help residence scientist in different tasks

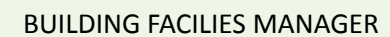
- Facilities needed:
- Workspaces
 - Labs
 - Greenhouses
 - Seed Storages
 - Accommodation



- Help scientists in research
- Help administration in public coordination

Facilities needed:

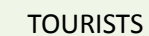
- Temporary accommodation
- Work space
- Lab
- Accommodation



- Responsible for building's mechanical system maintenance

Facilities needed:

- Mechanical Rooms
- Facilities monitoring room



- Attend lectures and seminars
- Visit exhibitions

Facilities needed:

- Reception and orientation space
- Exhibition Hall
- Lecture room



- Building's maintenance and cleaning

Facilities needed:

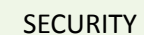
- Maintenance storage
- Accommodation



- Prepare food for building staff

Facilities needed:

- Kitchen
- Food storage and freezer
- Accommodation

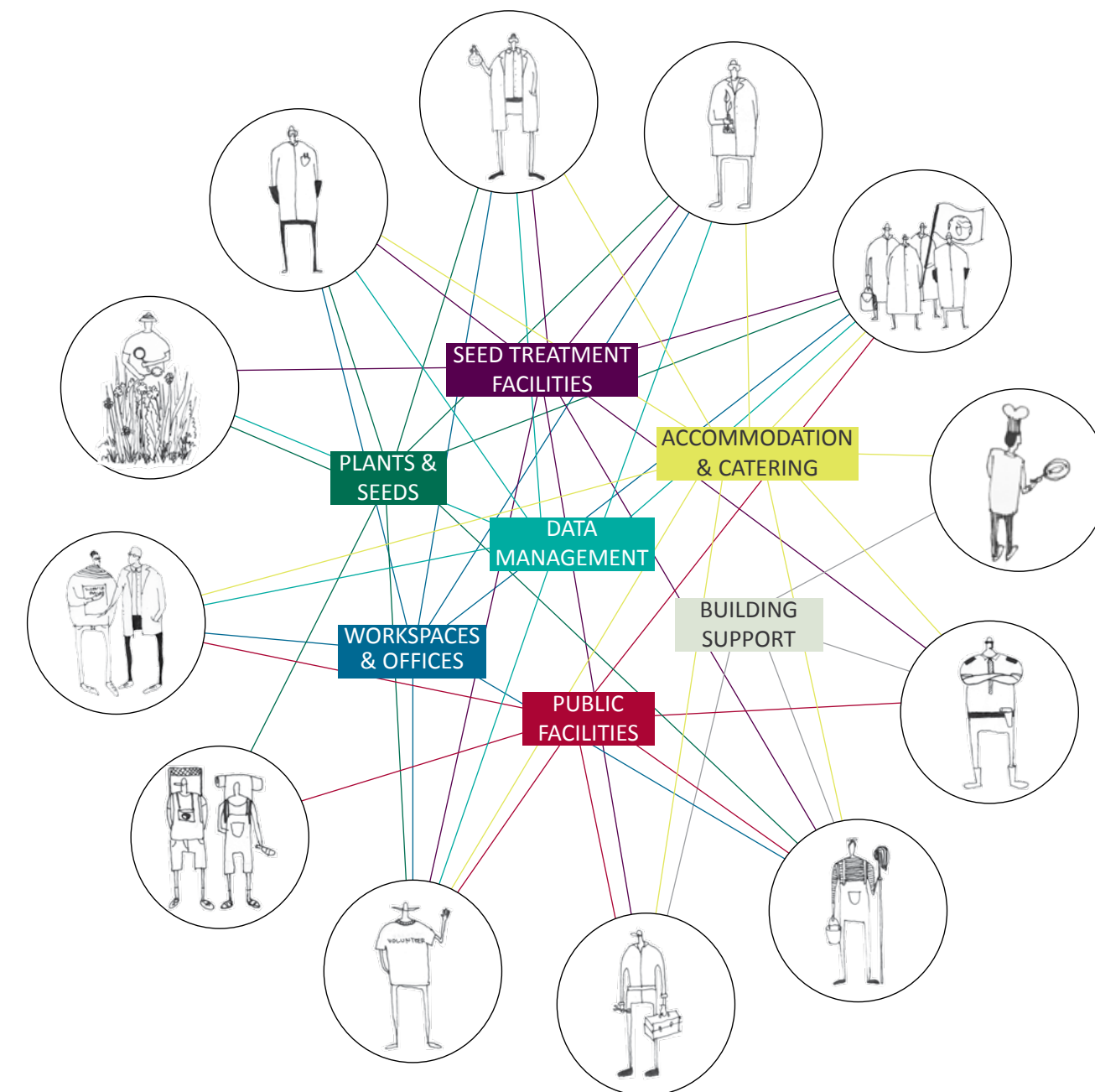


- Patrolling in premises
- Ensuring building security
- Monitor and authorize building access

Facilities needed:

- Security room
- Accommodation

STAKEHOLDERS' RELATIONSHIPS





CASE STUDIES

EXISTING SEED BANKS



LEGEND

- Taxonomic Seed Bank
- Local Seed Bank
- National Seed Bank
- International Seed Bank

* ENSCONET - Regional seed bank, coordinates seed activities in Europe

* Location of seed banks might not be accurate.

Sources:

- BGCI Plants of the Planet. *Seed Banks*. Resource Center. Botanic Garden Information. Web. < <http://www.bgci.org/resources/seedbanks/>>
- Ronca, Debra. *How Seed Banks Work*. 14 April 2008. HowStuffWorks.com. <<http://science.howstuffworks.com/environmental/green-science/seed-bank.htm>> 04 October 2012.

MILLENNIUM SEED BANK PROJECT

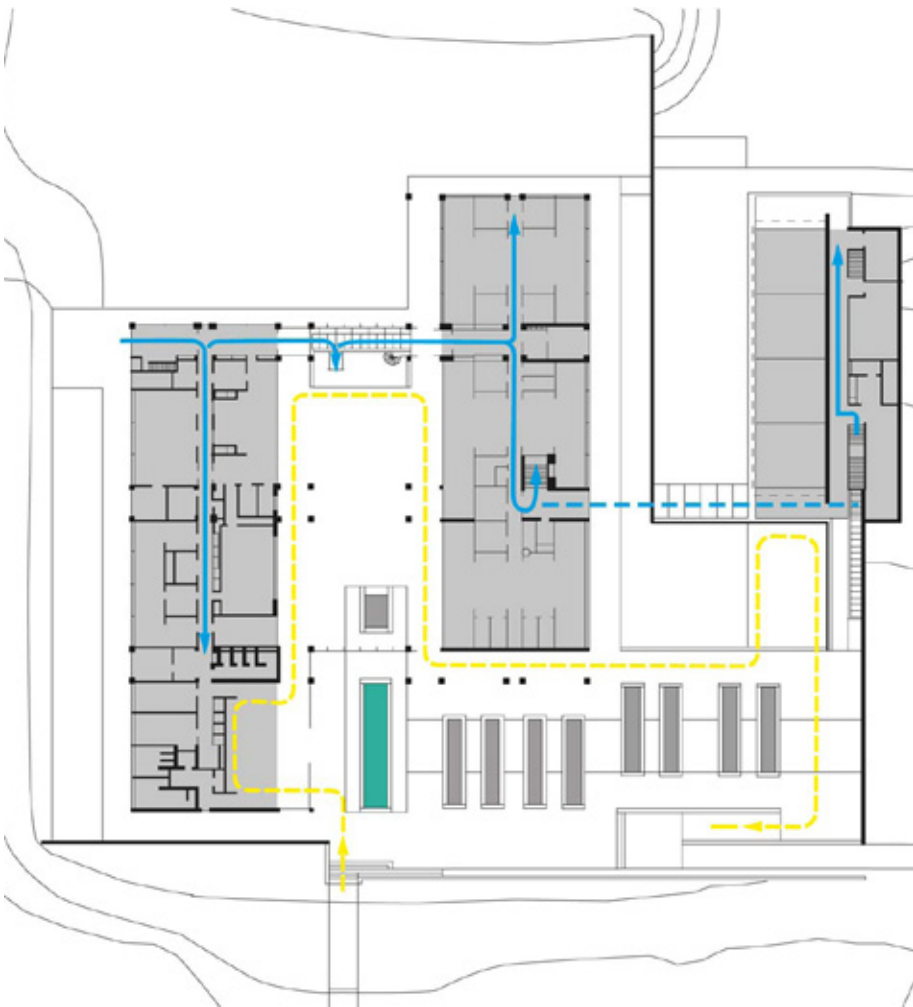
The largest seed bank of the world Millennium Seed Bank is an international conservation project and research center, a “living library” of over 3 billion seeds.

PROJECT DATA:

Architect: Stanton Williams
Client: The Royal Botanic Gardens Kew
Location: Wakehurst Place, West Sussex, England
Status: Completed 2000
Budget: £14.0 m

Millennium Seed Bank Project is an apt case for prototype design. It is interesting for it’s architecture, as well as its strategies and technical aspects. The seed bank is an effort undertaken by The Royal Botanic Gardens at Kew in West Sussex, United Kingdom. It has already collected 10% of the entire world’s flora and by 2020 the seed bank plans to have species representing 25% of global wild plant types. They study genetic information of species, take care of their germination and test their condition in every 10 years, reproduce seeds and send back to their native lands to restore the natural habitat. The building is an interesting hybrid of public and private facilities: researcher’s offices are mixed with public exhibition spaces. This visual connection is dedicated to raise curiosity and increase public awareness of the problem. Apart from the exposed complex research facilities - workspaces, labs and greenhouses, the seed bank has hidden part, too. This is the most important part of the facility - nuclear proof giant freezers, the underground seed vault which, if filled wall-to-wall, could hold 100,000,000,000 rice grains or 30 tightly packed double-decker buses. The cold storages have mechanical rooms with back-up systems, to prevent mechanical support from failure, in which case the entire database will be lost. Due to its location seed bank offers temporary accommodation for scientists working on the project.

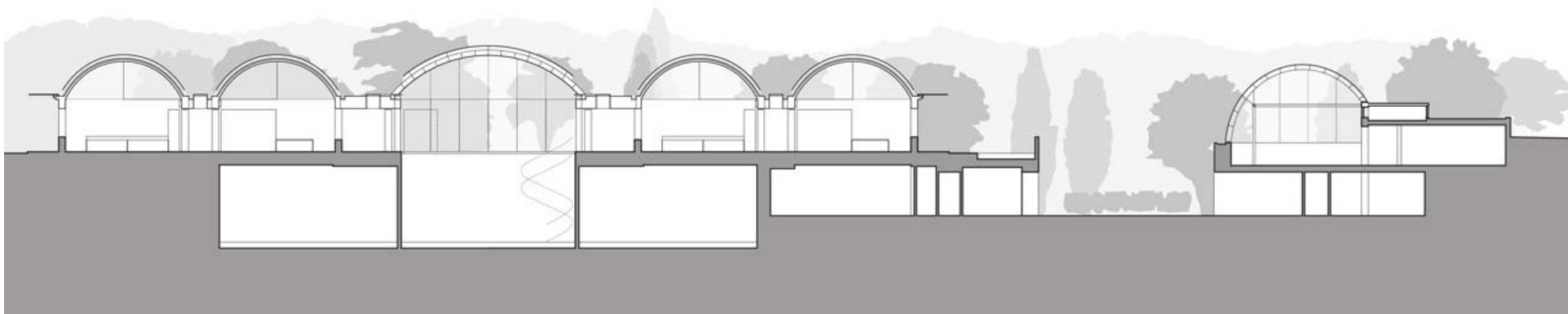




PROGRAM

Program of the Millennium Seed Bank Project was studied, since it has a potential to be used as a prototype. Program types and approximate total areas are given below:

Type of Space	Net Area (Sq.ft)
Workspaces	2,600
Labs	11,000
Data Management	500
Plant and Seed Facilities	5,700
Public Spaces	4,000
Accommodation	6,500
Building Support	4,000
Total Area	34,300



SEED CONSERVATION PROCESS

Kew Royal Botanic Gardens have been working with hundreds of partners in 54 countries to provide a “backup” system for their flora and help restore natural habitat. The Process of seed harvesting and conservation is another important topic for study.



Getting permission for seed collecting



Seed collection expeditions



Identifying seeds and asserting quality



Collecting seeds



Recording seed collecting data



Shipping



Unpacking seeds and checking papers



Identifying seeds



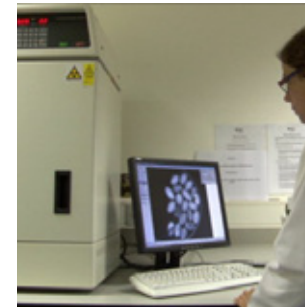
Recording data



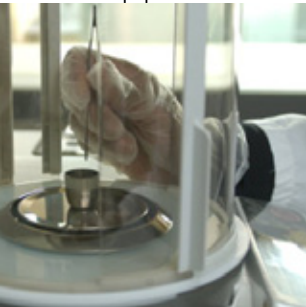
Assessing seed storage needs



Cleaning seeds



Checking seed quality



Estimating seed quality



Drying seeds



Packaging seeds



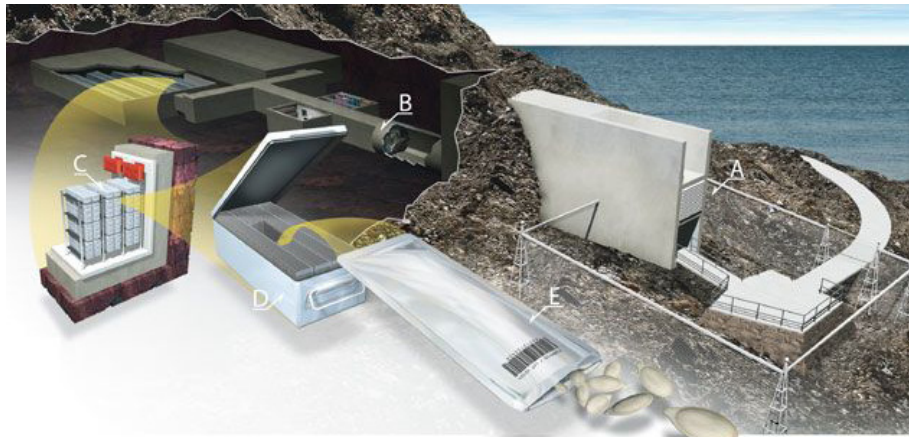
Placing seeds in cold storage rooms



Checking germination



Growing out



SVALBARD GLOBAL SEED VAULT

Svalbard Global Seed Vault is an **underground “backup system”** for the world agriculture located about 810 miles from the North Pole. The location and construction quality allows scientists freeze seeds with “endless” lifetime.

PROJECT DATA:

Architect: Peter W.Søderman
 Construction: Leonhard Nilsen & Sønner
 Lighting: Dyveke Sanne
 Client: The Global Crop Diversity Trust (GCDT)
 Location: Longyearbyen, Svalbard, Norway
 Status: Completed 2009

Seed banks are vulnerable due to poor construction, economical, mechanical or political reasons. Scientists decided to find a safe place in the world, remote from political interests, where they could conserve and preserve different crops’ species. They chose Svalbard Island – the furthest undisturbed and uninhabited place which is still easy to reach by plane. “Svalbard Global Seed Vault lies about 1 kilometre from Longyearbyen Airport as the crow flies, at about 130 metres above sea level and consists entirely of an underground facility, blasted out of the permafrost (at about minus 3-4 degrees Celsius). The facility consists of three separate underground chambers. Each chamber has the capacity to store 1,5 million different seed samples. With the aid of its own electric machinery, powered by electricity from the local power station, it will maintain a constant interior temperature of minus 18 degrees Celsius. The chambers will have storage shelving for prepacked examples of food seeds from the depositors (donor countries). The storage chambers themselves are reached via an access tunnel about 100 metres long, with an entrance portal on its outside. The entrance portal will be the only visible part of the facility. It is in the form of a long, narrow concrete “fin”, with an entrance of brushed steel. An artistic decoration on the outer roof surface and on the upper part of the front will partly reflect the polar light and partly give off a muted, glowing light. The Svalbard Global Seed Vault is financed by three Norwegian Ministries: The Ministry of Foreign Affairs, the Ministry of Environment and the Ministry of Agriculture and Food.” (Source: Norwegian Ministry of Agriculture and Food)

THE SEED CATHEDRAL

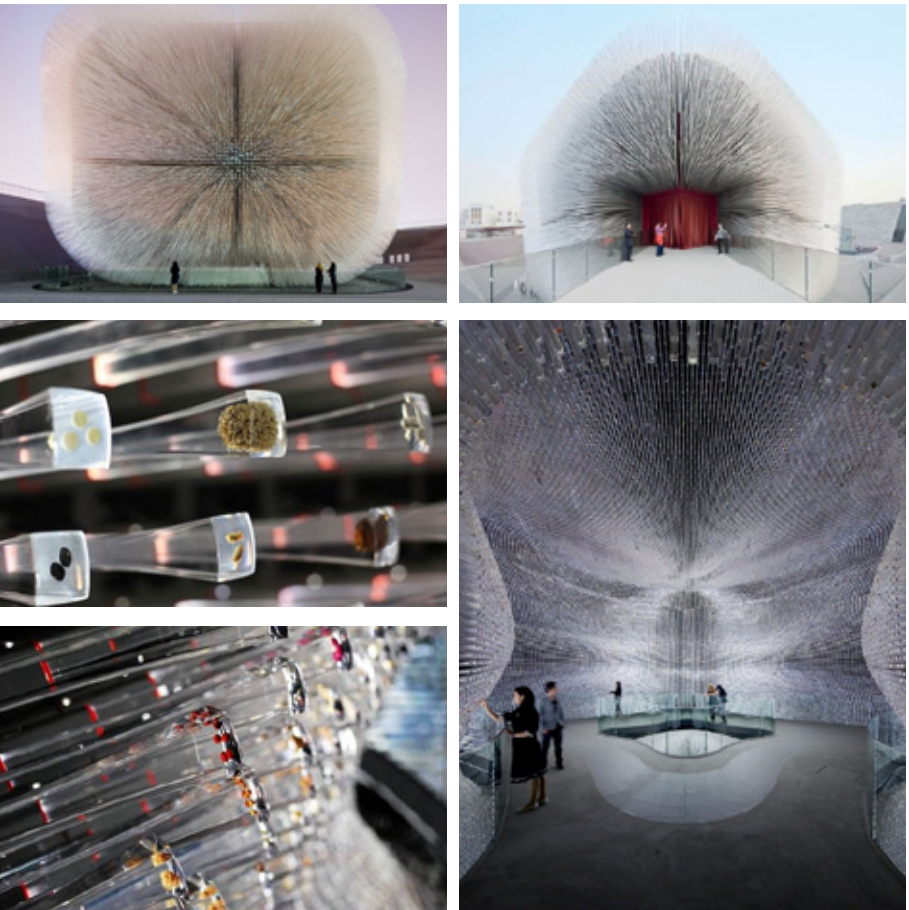
UK pavilion at Shanghai Expo is a beautiful representation of **British long traditions of botanical gardens.**

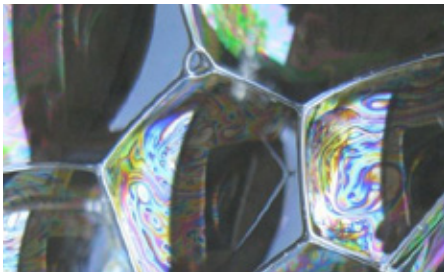
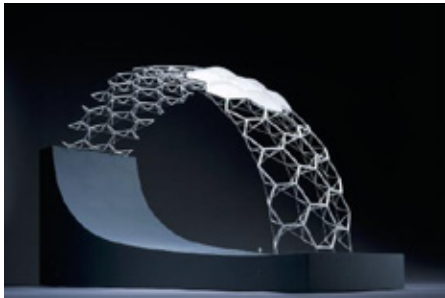
PROJECT DATA:

Architect: Heatherwick Studio
 Client: Government of UK
 Location: Shanghai, China
 Status: Completed 2010
 Area: 1,500 m2
 Budget: £25 m

Significance of this project is in a different approach to plant representation – in place of building a greenhouse, Heatherwick studio took seeds to define flora, to highlight how unique and beautiful the beginning of each plant can look like and turned seeds into the jewelry of the pavilion. “The Seed Cathedral is a box, 15 metres high and 10 metres tall. From every surface protrude silvery hairs, consisting of 60,000 identical rods of clear acrylic, 7.5 metres long, which extend through the walls of the box and lift it into the air. Inside the pavilion, the geometry of the rods forms a space described by a curvaceous undulating surface. There are 250,000 seeds cast into the glassy tips of all the hairs. By day, the pavilion’s interior is lit by the sunlight that comes in along the length of each rod and lights up the seed ends. You can track the daily movement of the sun and pick out the shadows of passing clouds and birds and, when you move around, the light moves with you, glowing most strongly from the hairs that point directly towards you. By night, light sources inside each rod illuminate not only the seed ends inside the structure, but the tips of the hairs outside it, covering the pavilion in tiny points of light that dance and tingle in the breeze.”*

*Source: Heatherwick Studio





EDEN PROJECT

The largest plant enclosure, the Eden Project is a significant and innovative project for its structural solution, consisting of 8 inter-linked geodesic domes.

PROJECT DATA:

Architect:	Nicholas Grimshaw
Client:	The Eden Project LTD
Engineer:	Anthony Hunt and Associats
Pr. Manager:	Davis Langdon
Constructor:	Alfred McAlpine
Biome:	MERO
Location:	Cornwall, England
Status:	Completed 2001
Area:	23,000 m2
Budget:	£57-£75 m

The greenhouse, the shape of which is a beautiful biomimicry of inter-linked soap bubbles, is a home of thousands of species. “Geodesic structures are perfect for covering the maximum enclosed volume with the minimal surface area. What was required in Eden’s case was two groups of four interlinked domes - like giant soap bubbles. Sophisticated computer analysis showed that for their huge scale, the strongest structure would be one made of two layers of hexagons, plus the occasional pentagon. This honeycomb structure could be modelled to fit the varying heights of the plant life inside. And rather than glass, the architects chose to clad the biomes in a relatively new substance called ethylene-tetrafluoroethylene, or ETFE. It is tough, highly transparent and about a hundred times lighter than glass. Eden’s biomes were not just required to enclose vast amounts of space, they also have to mimic alien climates, such as those of the humid tropics and warm temperate regions. Eden is designed to achieve these conditions using minimal additional energy. Most of the heat is generated passively, by storing the sun’s energy within the biomes and in the rock of their back wall. Ventilation and watering strategies are also largely low energy, with an active computer-controlled system to provide the fine tuning.”*

*Source: Steve Rose, the Guardian

JARDI BOTÀNIC DE BARCELONA

The Botanic Garden of Barcelona artificially recreates natural landscape conditions for plants of Mediterranean’s five different regions.

PROJECT DATA:

Architect:	Carlos Ferrater, Josep Lluís Canosa
Land.Architect:	Bet Figueras
Horticulturalist:	Artur Bossy
Biologist:	Joan Pedrola
Location:	Barcelona, Spain

The new Botanic Garden of Barcelona has revitalized an area of the mountain that had long been neglected and forgotten. The new Garden was designed by a team of architects, landscape architect, horticulturalist and biologist. “The Barcelona Botanic Garden is a municipal institution responsible for preserving collections of Mediterranean plants from around the world. Its main functions are conservation and documentation of Catalonia’s natural heritage. The Garden also acts as a source of information about botany and nature, promoting knowledge through activities designed for all kinds of groups, from professionals and enthusiasts to students. This dissemination promotes public awareness and fosters concern for nature.”* The design was based on two fundamental considerations:

1. The structuring of plants - the vegetation was grouped into five Mediterranean regions; the landscapes were recreated as they are found in nature.
2. Topographic conditions for different plant areas - plants are grouped according to the topographic needs and they are surrounded by pathways. The network of triangular-shaped paths follows the natural contour and helps avoiding major earthmoving operations. This mesh of paths creates 71 spaces of plant communities of the Mediterranean climate and takes visitors to 84 exhibition units known as phytoepisodes.

*Source: <http://w3.bcn.cat/>





EDF ARCHIVES CENTER

Simple and elegant archive building in France **can store 70 kilometer of shelves** (43.5 miles) for paper-based and microfilm-based archived material providing maximum fire protection and constant temperature and humidity.

PROJECT DATA:

Architect: LAN Architecture
 Client: EDF
 Pr.Manager: Christophe Leblond
 Location: Bure-Saurdon, France
 Status: Completed 2008
 Area: 6,800 m²

Archives are composed with 20 similar storehouses on 5 floors; the design team worked on different floor heights to get the maximum out of the minimum amount of the built-up area. “We realised a five level, 19 m high building within a plot of 3.30 hectares comprehensive of an archives area covering approximately 1,400 m² and a total surface of approximately 7,000 m². This approach results in:

- considerable saving in terms of the building’s envelope.
- improved functionality translated by a reduced number of kilometres covered per year,
- a marginal impact on the landscape (with view points at a considerable distance from the building),
- the possibility of a maximum use of the excavated land around the building’s footprint to control water recuperation and treatment on the site,
- an energetically and environmentally extremely high performance building,
- the creation of a symbol representative of the approach taken by the Mouse and Haute Marne economic support programme.”*

Heat production is based on renewable energies and a heat pump. The choice made for the ventilation was to use a double flow ventilation system with heat recuperation. Low voltage luminaries will result in considerable savings in terms of internal loads. The high performance of the envelope combined with economic ventilation and lighting systems reduces energy requirements. The total power consumed by the building represents 29 kWh/m²

*Cited from LAN Architecture’s official web-site

THE FACTORY

Abandoned cement factory was transformed into a **magical space** for the architect’s, Ricardo Bofill’s residential and office use.

PROJECT DATA:

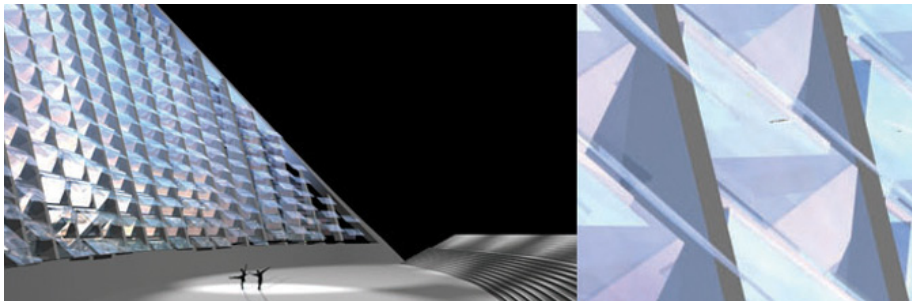
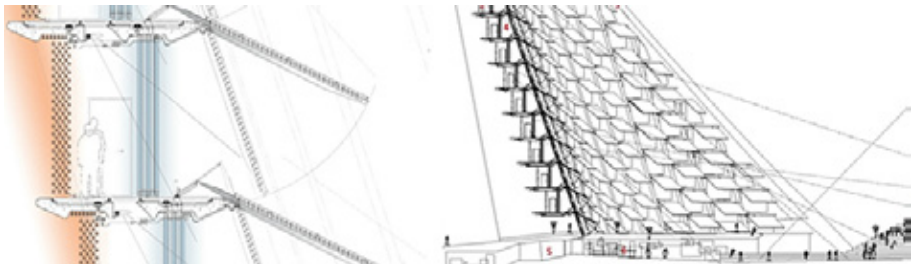
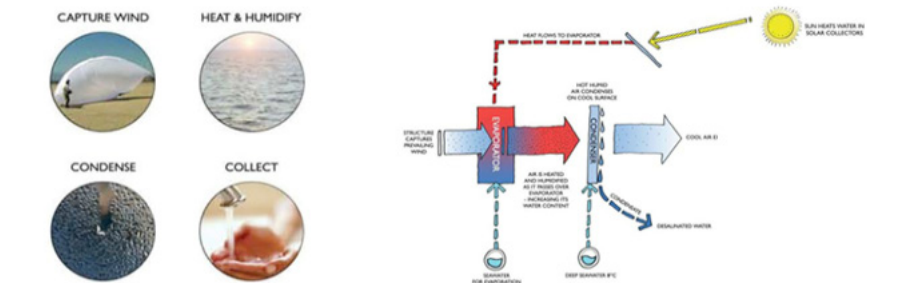
Architect: Ricardo Bofill, Taller de Arquitectura
 Location: Sant Just Desvern, Spain
 Status: Completed 1975

“In 1973 Ricardo Bofill found a disused cement factory, an industrial complex from the turn of the century consisting of over 30 silos, subterranean galleries and huge machine rooms, and he decided to transform it into the head office of Taller de Arquitectura. Remodelling work lasted two years. The factory, abandoned and partially in ruins, was a compendium of surrealist elements: stairs that climbed up to nowhere, mighty reinforced concrete structures that sustained nothing, pieces of iron hanging in the air, huge empty spaces filled nonetheless with magic. The transformation process began with the demolition of part of the old structure, laying previously concealed forms bare, as if the concrete had been sculpted. Once the spaces had been defined, cleaned of cement and enhanced with surrounding, newly-planted greenery, the process began of adapting the site to the new programme. Eight silos were left standing, and turned into offices, a modelling laboratory, archives, a library, a projection room and a huge space known as ‘The Cathedral’, the venue for subsequent exhibitions, lectures, concerts and a whole range of cultural activities linked to the architect’s professional life. The complex stands in the midst of gardens of eucalyptus, palms, olive trees and cypresses. It also features Ricardo Bofill’s house and guest rooms.

“The factory is a magic place which strange atmosphere is difficult to be perceived by a profane eye. I like the life to be perfectly programmed here, ritualized, in total contrast with my turbulent nomad life” Ricardo Bofill.

* Cited from Ricardo Bofill’s official web-site





LAS PALMAS WATER THEATRE

Nature inspired project, Las Palmas water theater was created mimicing Namibian fog-seeking beetle, developing a **fog harvesting strategy**.

PROJECT DATA:

Architect: Grimshaw Architects, Charlie Paton
 Location: Las Palmas, Canary Islands
 Status: Competition Proposal

The project is a competition entry to regenerate the port of Las Palmas. “The Grimshaw proposal created new mixed use accommodation on one of the jetties and a prominently positioned charismatib building - the Water Theater - the inspiration for which came from the Namibian fog-seeking beetle. This creature comes out at night and its matt black shell radiates heat to the night sky such that it becomes cooler than its surroundings. When the wind blows in from the sea, droplets of water form on the beetle’s shell which is covered with hundreds of tiny hydrophilic bumps. between the bumps is a waxy, hyfrophobic surface which causes the water to stay in tight droplet form which is more mobile than a film of water. Before sunrise the beetle tips its shell so that the water droplets run down to its mouth.

In Las Palmas we discovered that there were ideal conditions for this desalination technology. Firstly there was a very steady wind direction all year round. Secondly, there was plentiful sunshine which meant that basic solar thermal panels could be used to heat the seawater into the evaporators so that more moisture could be picked up by the wind blowing through. Thirdly the Canary Islands are volcanic so they have very steep sides below the sea which makes it fairly cheap to put a pipe down the deep sea water. A thousand meters below the surface the sea temperature is 8 degrees centigrade so if this cold water were used in the condenser elements, together with the advantages outlined above, it would create a highly productive desalination plant.”*

Lead designer Neven Sidor assembled evaporators and condensers into a sculptural form. Desalination process was optimised by incorporating wind flaps.

*Source: <http://www.exploration-architecture.com/section.php?xSec=27>

ENDESA PAVILION

Solar prototype represents a great example of a parametric design driven by passive strategies, where “**form follows energy**”.

PROJECT DATA:

Architect: IaaC
 Location: Barcelona, Spain
 Status: Completed 2011

ENDESA Pavilion is interesting for its geometric form, allowing maximum possibiligies for capturing solar energy. This self-sufficient solar prototype was installed at the Marina Dock, within the framework of the International BCN Smart City Congress.

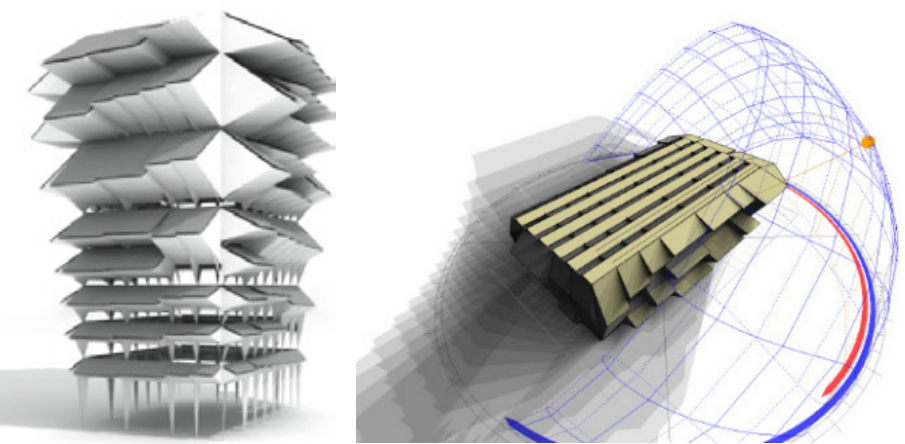
“The pavillion is actually the prototype of a multi-scale construction system. A facade composed by modular components, like solar brick, that respond to photovoltaic gaining, solar protection, insulation, ventilation, lighting ... The same parametric logic adapt façade geometries to the specific environmental requirements for each point of the building. It is a single component that integrates all levels of intelligence that the building needs.

From “form follows function” (classic XX century statement) to “form follows energy”. The facade opens reacting to the solar path, being active and becoming permeable towards south, while becoming closed and protective towards north. The behavior of this skin makes visible the environmental and climatic processes that surrounds the prototype.

The final geometry responds to the energy of the place. Thus, the pavilion becomes permeable and active towards south, where the interaction energy is maximized.; Towards north becomes opaque, closed and protective, minimizing heat transfer. Higher overhangs allow more energy collection and greater protection against the incident radiation during summer.

Solar calculation software, connected to the logic of parametric design, allows us to reach an optimized solution.Each module, at each point, responds with mathematical accuracy to the different stresses of the different orientation and position.” *

*Cited from IaaC official web-site





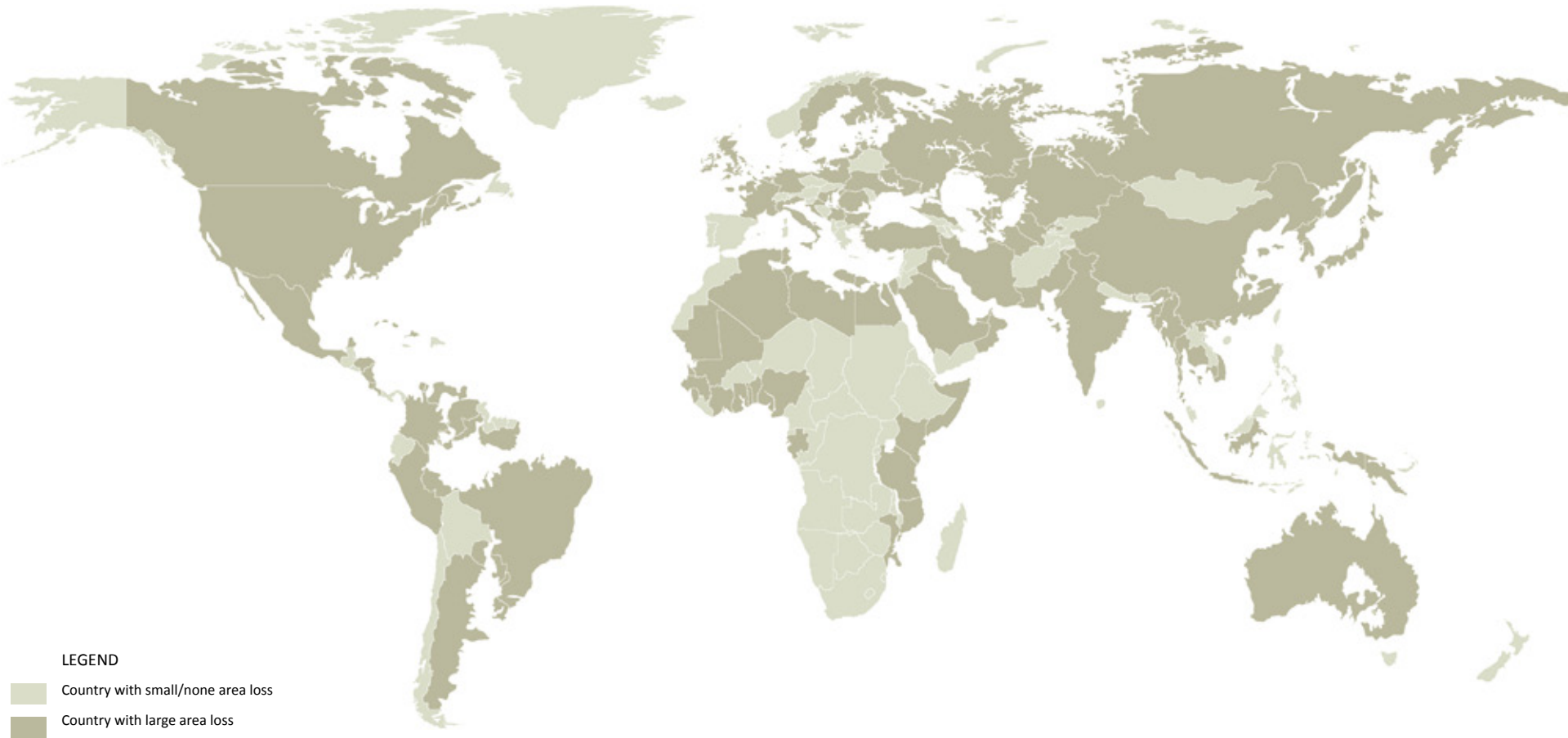
SITE

SITE SELECTION CRITERIAS:

1. GEOGRAPHICAL CHANGES

As mentioned before, scientists predict the **rise of water level by 7 to 23 inches** (18 to 59 centimeters) in the entire world. Since the seed banks are crucial for survival, I need to make sure to pick up flood-safe locations.

World Map 2050 - Flooding caused by the change of water level by 100 meters (328’)

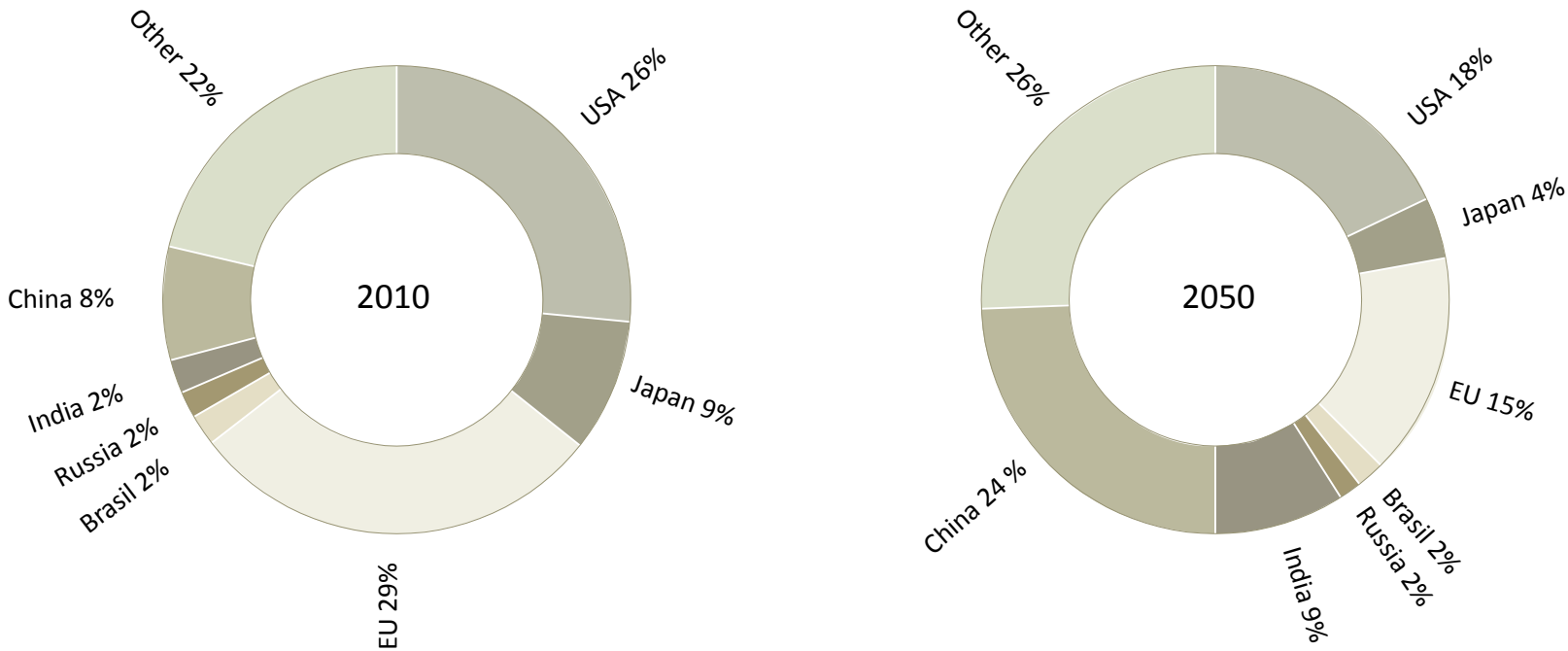


*Source: Buffalo Web. < <http://vrstudio.buffalo.edu/~depape/warming/World100-8190.jpg>>

2. ECONOMIC CONSISTENCY

According to the main-Board Trustee of Millenium Seed Bank Project Johnathan Drori, maintenance and research funds for Millennium Seed Bank is reaching ten million dollars annually. Maintaining the central buildings of the bank network will need a **strong economical background and consistency**, so the location is resulted by world GDP current projection and future predictions.

Regional shares of the world GDP in 2010 and 2050

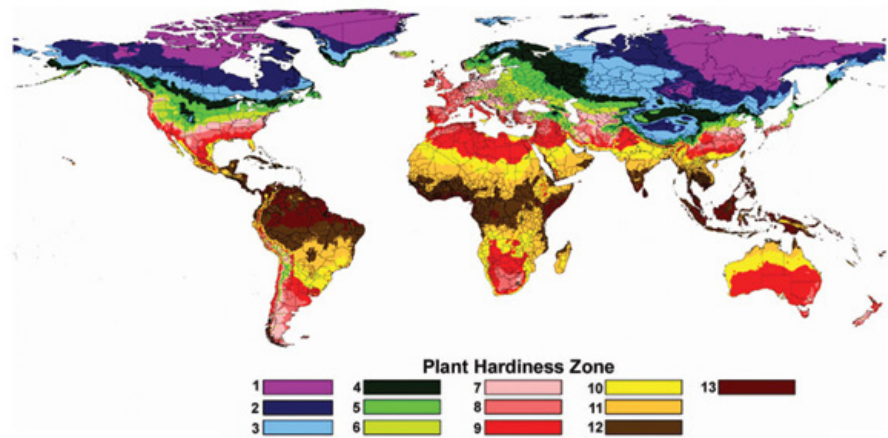


*Source: *Global Europe 2050. Executive Summary*. European Commission, European Research Area, Social Sciences and Humanities. Web. October 2011. <http://ec.europa.eu/research/social-sciences/pdf/global-europe-2050-summary-report_en.pdf>

3. FLORA DIVERSITY

While locating sub-centers, I need to find **home for each type of plant**, keeping in mind distances for transportation. Plant hardiness zones help me identify location needs regional centers, while plant diversity hotspots locate both national, and regional seed banks.

THIRTY-YEAR GLOBAL PLANT HARDNESS ZONE MAP FOR THE PERIOD 1978-2007

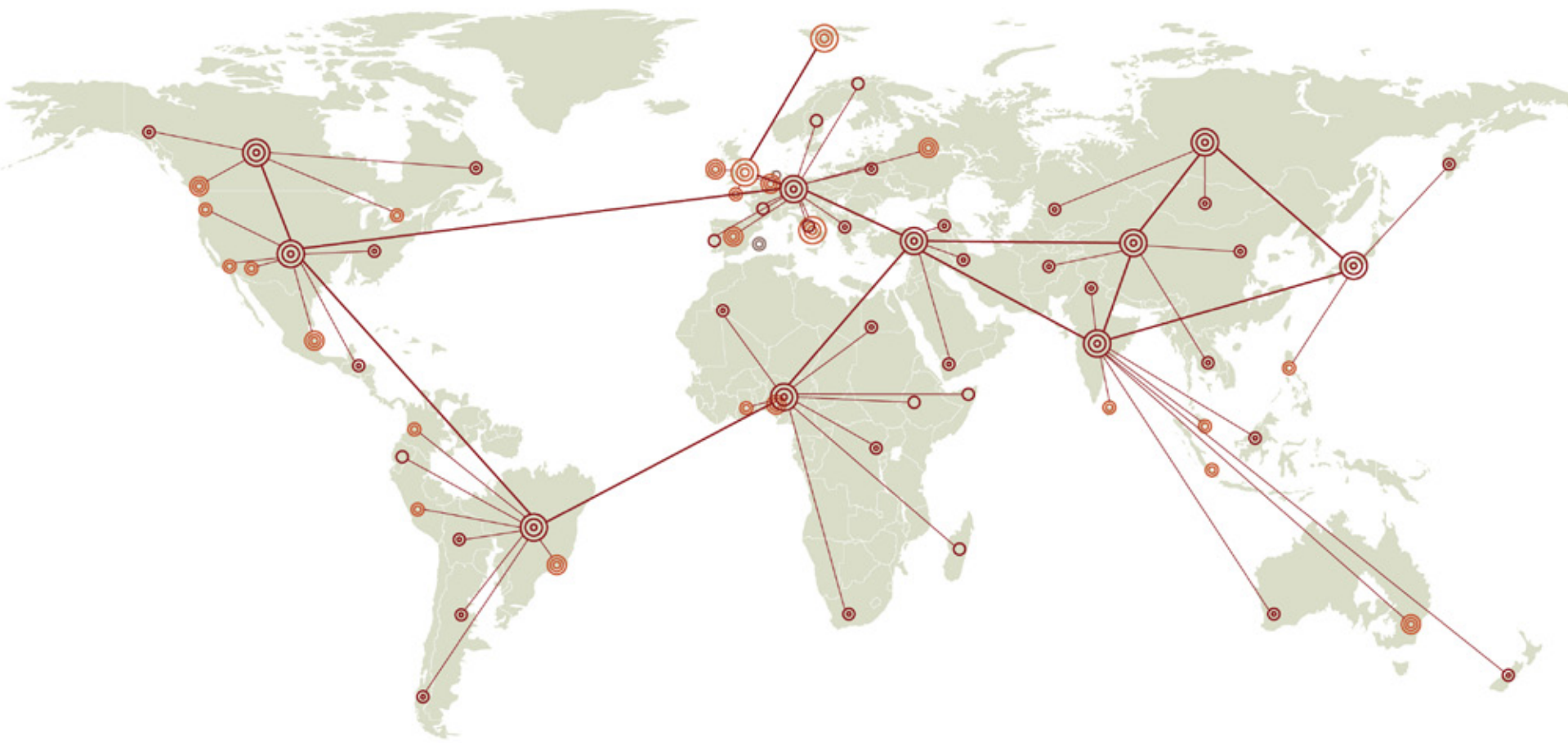


PLANT DIVERSITY HOTSPOTS



*Source:
• Scientia Agricola. *Global plant hardiness zones for phytosanitary risk analysis*. (Piracicaba, Braz.) vol.65 no.spe Piracicaba. Dec. 2008. Web. <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-90162008000700009>

PROPOSED SEED BANK NETWORK

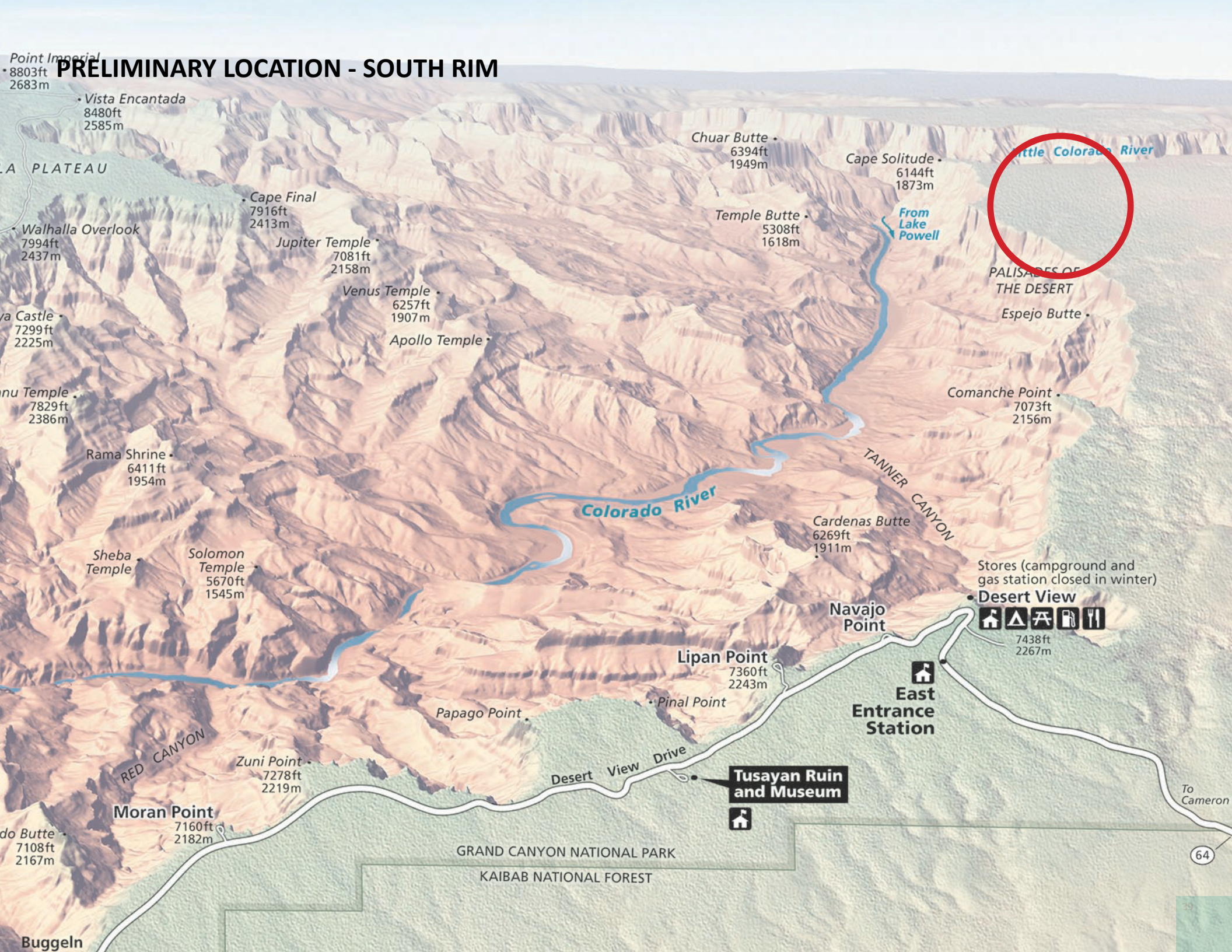


- LEGEND
- Taxonomic Seed Bank
 - Local Seed Bank
 - ⊙ National Seed Bank
 - ⊗ International Seed Bank
 - Taxonomic Seed Bank with high chance to be flooded
 - National Seed Bank with high chance to be flooded
 - ⊙ Proposed National Seed Bank
 - ⊗ Proposed Regional Seed Bank
 - ⊗ Proposed International Seed Bank

PROTOTYPE IN UNITED STATES - THE GRAND CANYON



PRELIMINARY LOCATION - SOUTH RIM





PROGRAM

QUANTITATIVE ANALYSIS

WORKSPACES	qty	net sq.ft	total net sq.ft	Notes
Administration Office	1	250	250	
Project Manager’s Office	1	270	270	
Researcher’s Office	12	150	1,800	
Meeting Room	1	270	270	

TOTAL SQ.FT 2,590

LABS	qty	net sq.ft	total net sq.ft	Notes
General Lab	2	600	1,200	
Seed Reception/quarantine	1	270	270	
Machinery Room	1	270	270	
Voucher Room	1	300	300	
Incubator/Germination	1	1,600	1,600	
Thermo-gradients	1	270	270	
DNA Lab	1	900	900	
Centrifuge Room	1	65	65	
Freezer	1	65	65	-94° F (-70° C) temperature needed
Freezer	1	40	40	-94° F (-70° C) temperature needed
Clean Room	1	750	750	
Cleaning Room	1	600	600	
Washing Room	1	215	215	
Main Drying Room	1	1,300	1,300	
Dry Room	1	250	250	
Cold Room	1	65	65	
Preparation Room Ovens	1	300	300	
LN² Room	1	65	65	
Agar Room	1	270	270	
Autoclave Room	1	230	230	Space for autoclave device for equipment sterilization
Balances	1	65	65	
Tissue Culture/Cryopreservation	1	185	185	
Chemical, Gas and LN² Store	1	430	430	
Generator	1	270	270	
X-ray Room	1	750	750	X-ray used to determine proportions of empty or infected seeds
Store Room	1	350	350	
Dark Room	1	200	200	

TOTAL SQ.FT 11,275

DATA MANAGEMENT	qty	net sq.ft	total net sq.ft	Notes
Archive	1	230	230	
Data	1	180	180	
File Server	1	80	80	

TOTAL SQ.FT 490

PLANTS AND SEEDS	qty	net sq.ft	total net sq.ft	Notes
Seed Storage	3	1,300	3,900	-1° F (-18° C) temperature needed
Greenhouse	1	5,000	5,000	Needs a link to the labs
Potting Shed	1	750	750	

TOTAL SQ.FT 5,750

PUBLIC AWARENESS	qty	net sq.ft	total net sq.ft	Notes
Reception and Public display	1	270	270	
Exhibition Space	1	2,000	2,000	
Seminar Room	1	1,000	1,000	
Library	1	1,000	1,000	

TOTAL SQ.FT 4,270

ACCOMMODATION	qty	net sq.ft	total net sq.ft	Notes
Double Room	15	200	3,000	
Bathroom	15	45	675	
Lounge	1	400	400	
Canteen	1	700	700	

TOTAL SQ.FT 6,450

BUILDING SUPPORT	qty	net sq.ft	total net sq.ft	Notes
Restrooms	2	150	300	
Security Room	1	200	200	
Maintenance Room	1	45	45	
First Aid	1	100	100	
Storages	1	1,000	1,000	
Mechanical Rooms	1	2,500	2,500	

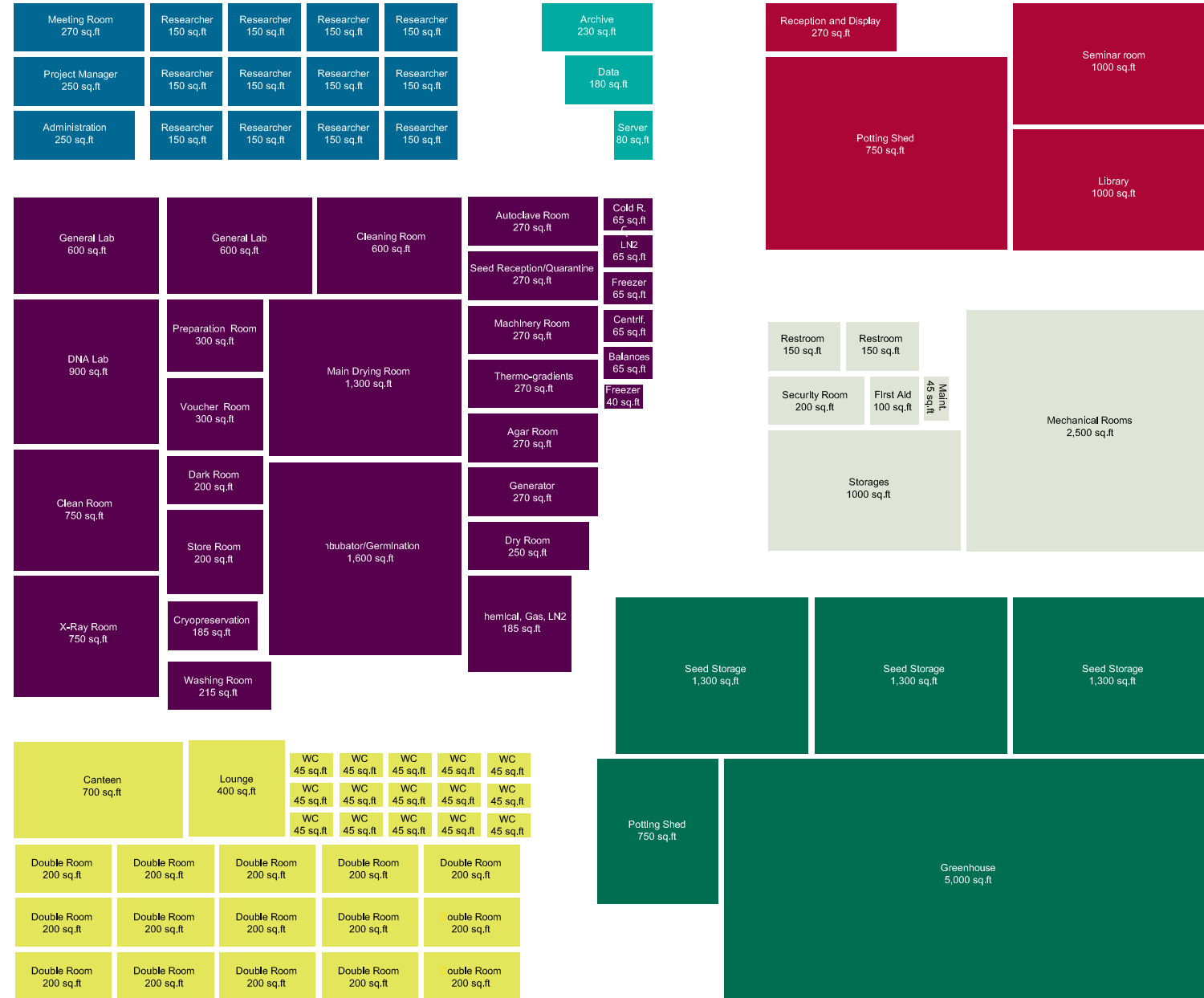
TOTAL SQ.FT 4,145

+ 10% circulation

TOTAL AREA 38,467

PROGRAM SCALED

Scale: 1"=32'



FUNCTIONAL RELATIONSHIPS

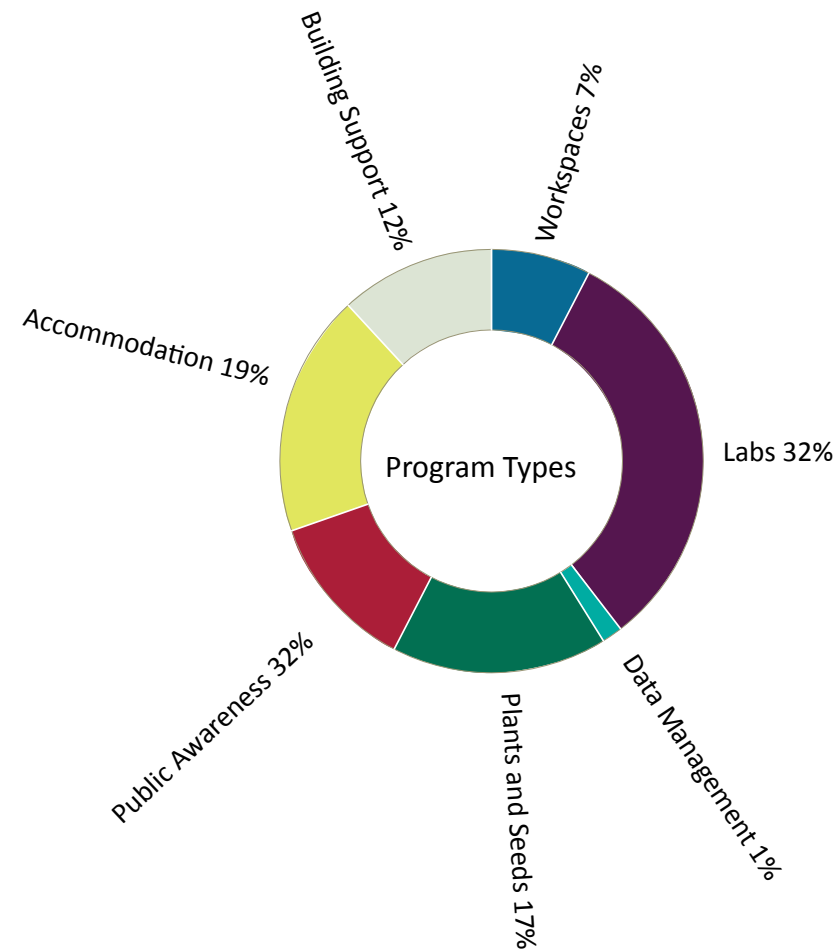
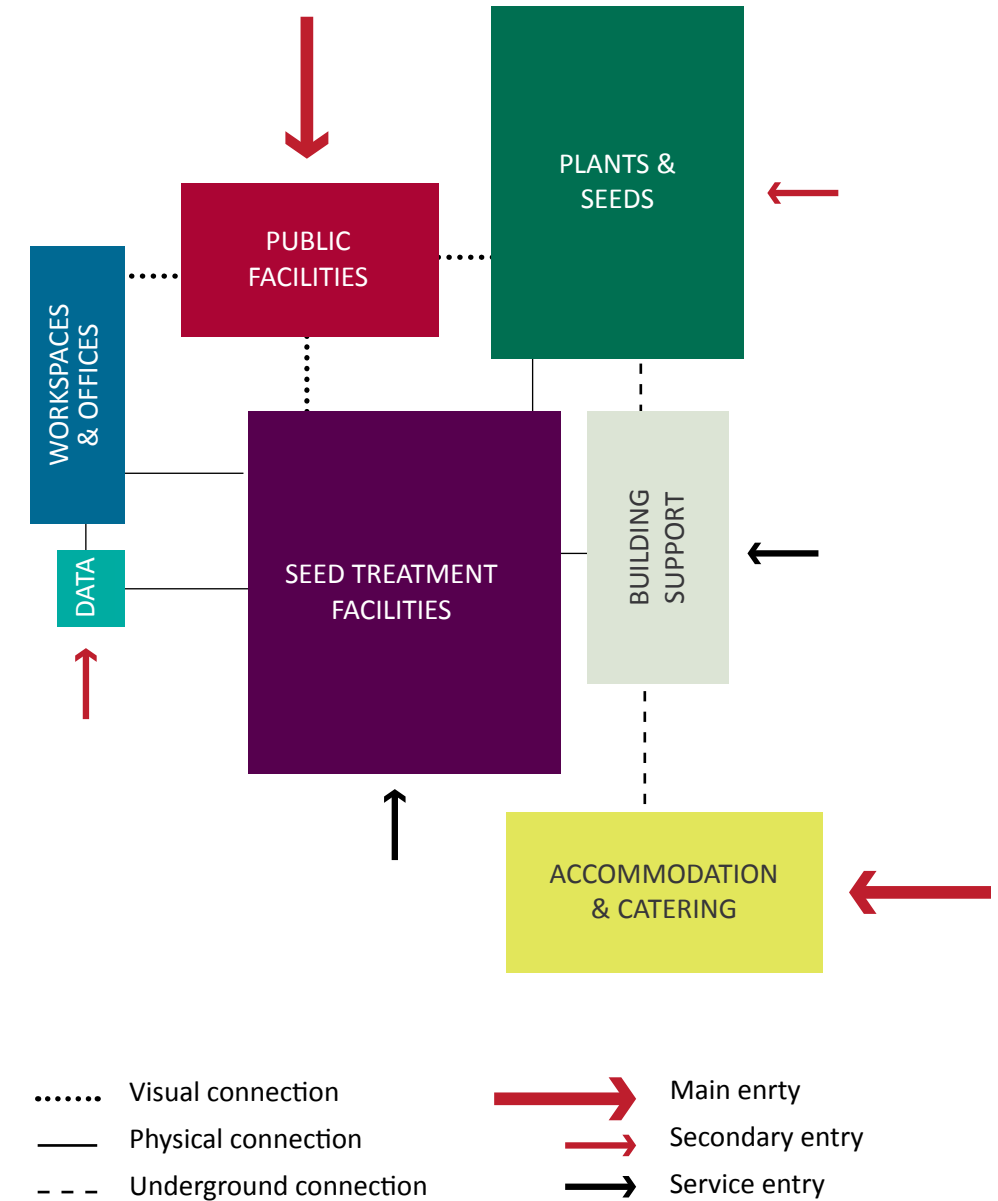


Diagram of connections

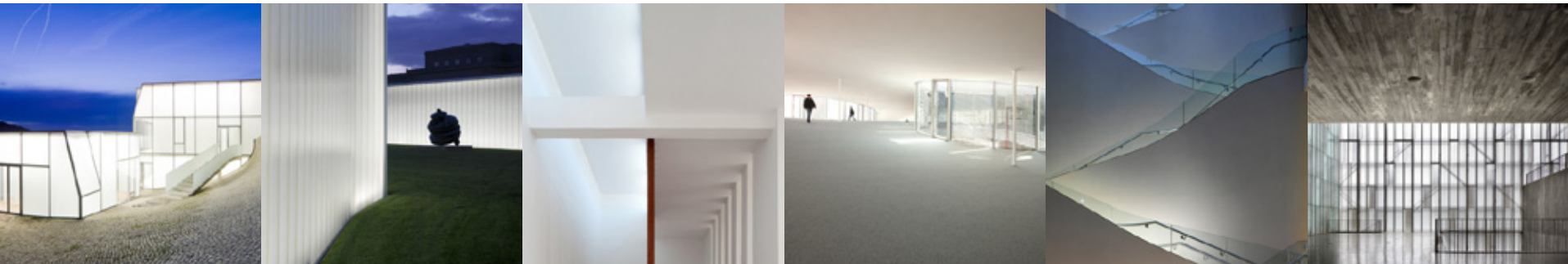
Scale: 1"=64'



AESTHETIC QUALITIES

Light Condition

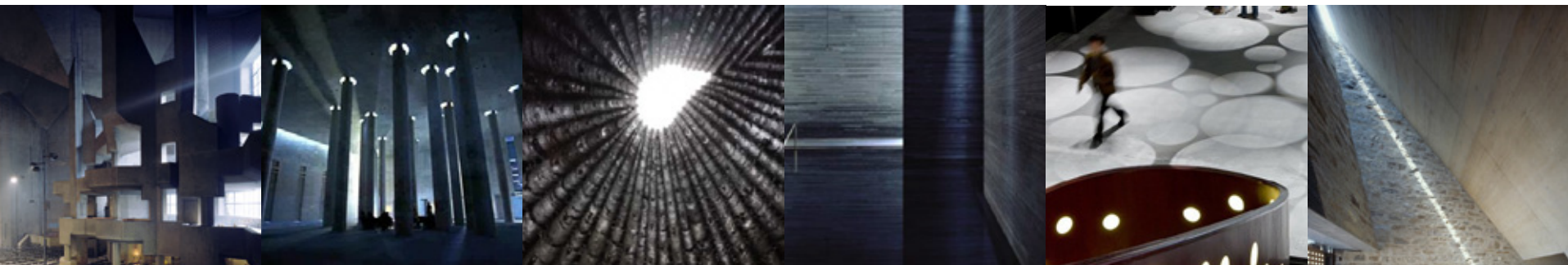
Public Spaces



Offices and Labs



Seed Storages

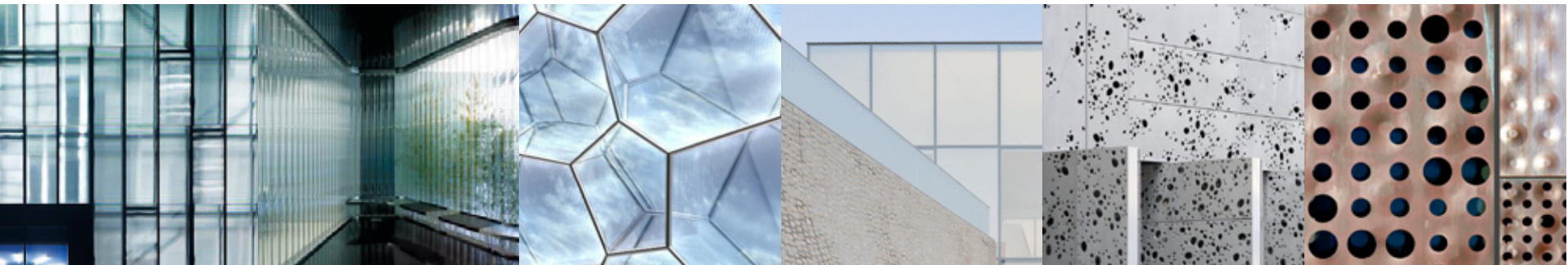


Materiality

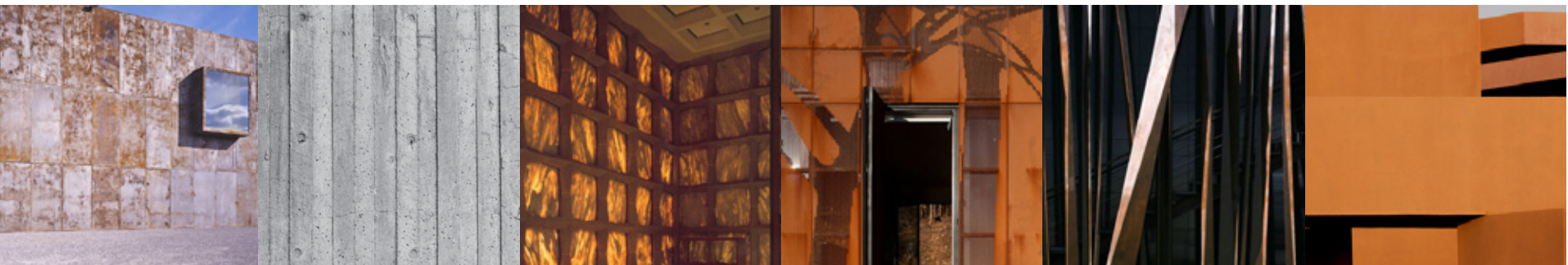
Soft Surfaces



Transparent and semi-transparent surfaces



Hard Surfaces



A misty forest scene with tall, thin trees. The ground and lower branches are covered in a light layer of mist or fog. Some trees have small, orange-brown leaves or berries on their branches. The overall color palette is cool, with blues, greys, and muted greens.

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